Iowa
Agricultural Education
Competency Lists

June 1999

Validated/Minimum Competencies
for educational programs in the areas of:

Agricultural Business, Service and Supply
Agricultural Production
Agricultural Mechanics
Horticulture
Agricultural Products and Processing
Natural Resources

IOWA DEPARTMENT OF EDUCATION
Bureau of Technical and Vocational Education
Grimes State Office Building
Des Moines, Iowa

Agricultural Education Competency Lists

Introduction

This document is a compilation of minimum competencies to be included in the study of the seven occupational areas of agriculture at the secondary school level: Agricultural Sales & Service, Agricultural Production, Agricultural Mechanics, Horticulture, Agricultural Products & Processing, Forestry, and Conservation & Natural Resources. In this document, we have combined Forestry and Conservation & Natural Resources under one title of Natural Resources. Also, the terms Agricultural Business has been added to the terms Service & Supply. One of the lists is entitled "Technology". The items in this list can be a part of each of the other areas.

The reader should note that these lists consist of MINIMUM competencies. This document is NOT a compilation of all the knowledge and skills to be learned in each occupational area. Local program content and delivery are dependent on inputs from learners, teachers, advisory councils, parents, employers and other stakeholders.

The competencies listed in this document have been identified and validated by leaders and professionals in each of the occupational areas. The latest validation process was conducted in 1999.

Readers should use this updated list as a source for guidance in constructing their curriculum guides for secondary school programs in agriculture.

Agricultural Mechanics

Occupational

1. Describe characteristics of a quality weld.
2. Explain arc, braze, and wire fed welding terms and principles.
3. Set up equipment, prepare metal and complete corner, fillet, lap and butt welds on mild steel in various positions with wire fed braze and arc welders.
4. Differentiate between cast iron, metallic arc, gas tungsten, TIG, oxy/act. Welding including the selection of equipment and supplies.
5. Set up and maintain equipment, cut a hole, straight line, and bevel on flat mild steel using a gas torch and/or plasma cutter.
6. List the advantages of brazing and complete a braze weld using gas welding equipment.
7. Describe ingredients and mixes of high quality concrete.
8. Calculate the volume of concrete to be ordered based on a design plan.
9. Demonstrate site preparation, placement and proper curing of quality concrete.
10. Describe wiring standards for agricultural applications.
11. Describe basic principles of electricity and define electrical related terminology.
12. Describe importance of proper grounding systems and ground-fault protection.
13. Describe relationship between volts, ohm, amps, watts and kilowatts.
14. Identify symbols from basic wiring circuits.
15. Measure and trouble shoot electrical circuits (to include charging and starting systems) using a circuit test.
16. Demonstrate installation of a simple electrical circuit with switch, receptacles, and over current protection.
17. Demonstrate work with electricity in a safe manner.
18. Identify factors for selecting motors and protection devices based upon types of application.
19. Complete the following plumbing joints: plastic, copper solder, compression joints and threaded pipe.
20. Explain functions and applications of electrical circuits and sensors used in agricultural equipment.
21. Explain the function and operating principles of two-stroke and four-stroke gasoline diesel engine systems.
22. Perform routine care, maintenance and perform tune-up of a gasoline engine.
23. Utilize service or operator's manuals, and catalogs to complete a job.
24. Explain the terms compression ratio, and piston displacement.
25. Perform a four-stroke or two-stroke cycle engine overhaul.
26. Troubleshoot and diagnose malfunctions pertaining to engines.
27. Select and properly use hand and power tools.
28. Determine tap and die sizes and thread pitch.
29. Demonstrate proper measurement and layout of a mechanics project.
30. Select abrasives for grinding and sharpening.
31. Recondition tools such as twist drill, chisels, punches.
32. Explain the relationship among pressure, velocity, flow and power in a hydraulic system.
33. Select hydraulic components from a vendor's sales literature.
34. Identify components of hydraulic systems.
35. Describe basic hydraulic functions including fluids, fluid cleanliness and filtration.
36. Select fuels, lubricants, hydraulic fluids and filters by service classifications.
37. Interpret and follow recommended service and maintenance schedules using operator's manuals.
38. Identify and compute harvest losses.
39. Demonstrate adjustment or calibration seeding, fertilizing, spraying, harvesting, tillage, or processing machinery.
40. Compare types of drives, used in agricultural machinery.
41. Identify common applications of agricultural machinery and major trends in technology.
42. Interpret plans and working drawings.
43. Sketch a simple line drawing of a three dimensional object showing top, bottom, and front views.
44. Identify basic structural parts of a building.
45. Identify environmental problems in agricultural structures such as livestock buildings and chemical storage facilities.
46. Plan and evaluate farmstead and agricultural building design and layout.

47. Demonstrate use of level for determining slope for building layout.
48. Identify types of erosion control structures.
49. Complete a simple construction project of good quality.
50. Develop a bill of materials and projected cost list.
51. Identify common building materials, hardware and their uses.
52. Calculate board feet, square feet, and linear foot of lumber or metal.
53. Use basic computer functions or word processing, spreadsheet, and database management.
54. Describe career opportunities in various areas of agricultural mechanics.
55. Explain basic procedures for emergency rescue involved in agricultural related accidents.
56. Use shop tools in a safe manner.
57. Handle hazardous chemicals and flammable materials according to product label.
58. Operate agricultural equipment in a safe manner.

Leadership

1. Listen effectively.
2. Follow directions.
3. Manage conflict (personal and customer).
4. Prioritize a series of tasks.
5. Utilize time effectively.
6. Speak effectively in front of others.
7. Work effectively with others.
8. Define goals.
9. Delegate duties.
10. Adapt to environment/situation.
11. Facilitate group interactions (teamwork).
12. Lead a discussion.
13. Organize an event.
14. Become personally involved in a professional organization.

Job Getting, Job Keeping

1. Identify skills, physical and emotional requirements for a job.
2. Complete required forms.
3. Construct an application letter.
4. Evaluate job offer, benefits, time, and working environment.
5. Interact with others in a courteous and tactful manner.
6. Cooperate with others.
7. Accept individual differences.
8. Respect the property of others.
9. Organize thoughts and clearly express point of view.
10. Organize thoughts and write clearly.
11. Exhibit dependability/responsibility on the job.
12. Demonstrate punctuality.
13. Ask for help when needed.
14. Accept new challenges.
15. Demonstrate initiative.
16. Accept supervision willingly.
17. Adapt to change/demonstrate flexibility.
18. Manage time effectively.
19. Follow rules and regulations.
20. Produce quality work.
21. Work within guidelines.
22. Take responsibility for mistakes and/or good work.
23. Comply with safety and health rules.
24. Utilize equipment correctly as shown/demonstrated by a supervisor.
25. Compose a resume.
26. Maintain clean and orderly work area.
27. Demonstrate personal hygiene and cleanliness.
28. Explain the relationship between public and private sectors.

29. Explain the concept of competition.
30. Analyze the concept of supply and demand.
31. Explain the concept of organized labor and business.
32. Explain the concept of business cycles.
33. Explain the nature of international trade.
34. Explain the concept of profit.
35. Demonstrate proper telephone etiquette.

Entrepreneurship

1. Analyze business organizations.
2. Identify skills required of a business owner. Recognize relevant, ethical issues in business.
3. Recognize relevant, ethical issues in business.
4. Identify the personal characteristics of entrepreneurs.
5. Analyze the contents of a business plan.
6. Recognize the importance of technical assistance.
7. Explain types of business ownership.
8. Identify factors in obtaining finances for a new business.
9. Demonstrate the ability of market analysis.
10. Develop positive community relations.